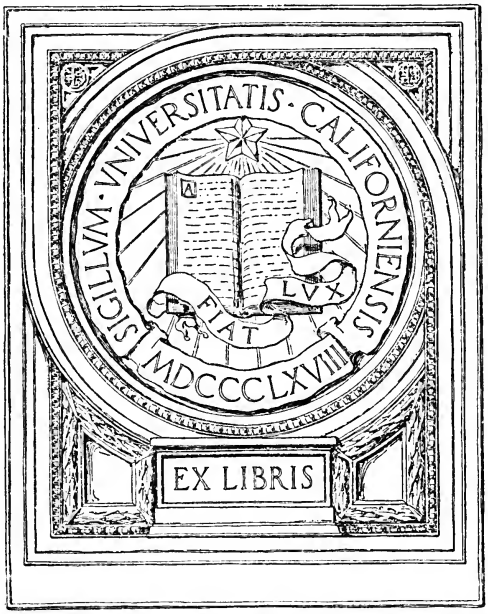

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EXPLANATORY NOTE

This pamphlet contains the major part of the thesis submitted by Mr. Virgil E. Dickson to the Educational Department of the Leland Stanford Junior University in fulfillment of certain requirements for the degree of Master of Arts in Education. The study was made at the University under the direction of Dr. Lewis M. Terman.

Mr. Dickson has been for five years Superintendent of the State Normal Training School at Cheney, Washington. He made this study while on leave of absence, hence, we publish this thesis (with permission of Dr. Terman) believing that it will be helpful and suggestive to others who may be struggling in this new but important field of educational reorganization.

N. D. SHOWALTER, President,
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INTRODUCTION

During the past few years much has been written about the individual differences in children found in the same grade and in the same class room of our elementary schools. The age differences are among those most commonly emphasized. The data concerning age are among those most easily secured and are apt to be reasonably accurate. Many interesting problems have developed out of the study of the over-age children. After a rather extensive study in 1908 Ayers reports* that "on an average one-third of the children in our city schools are over age for their grade." Commenting upon the mixture of bright children, normal children, and retarded children in the same class he says, "From the standpoint of the school the vital thing is the fact that classes are now composed of heterogeneous elements. The child of nine years acts and thinks differently from the child of seven years. Put the two in the same class and the work of the teacher is increased, the amount of attention she can give to each diminished, and the effect of the teaching lessened. From the standpoint of the child the essential evil of retardation is that it lessens the prospect of securing a reasonably complete elementary education."

From another study conducted by G. D. Strayer in 1911† we find that in the schools of 133 cities of the United States, 38% of the boys and 32% of the girls are over age. After citing the fact that the 1st grade of the city schools of Los Angeles has in it 2 boys 5 years of age; 1,237, 6 years of age; 835, 7 years of age; 328, 8 years of age; 95, 9 years of age; 49, 10 years of age; 19, 11 years of age; 8, 12 years of age; 4, 13 years of age; 2, 14 years of age; and 1, 15 years of age, Strayer mildly observes, "When you find in one grade children from 8 to 15 years of age, the work of the teacher can not, under such conditions, be as effective as it should be."

That these differences have not been exaggerated, and that they do not represent exceptional conditions can be discovered easily by anyone who will investigate the average class rooms of almost any system of schools in our country.

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* "Laggards In Our Schools," by Leonard P. Ayers.

† U. S. Bureau of Education Bulletin 1911 No. 5—Whole No. 451.

Chapter I

THE PURPOSE AND PLAN OF THE PRESENT STUDY

So far as the writer has been able to discover there has been no extensive study made of the individual differences of children found in any particular grade, due to the differences in mental level. It appears to us that such differences are apt to be the most logical point of attack for some of our most serious school problems.

Purpose

The first object of this study is to discover, by means of psychological tests, the mental ages of children in the first grade of public school work—in other words, to discover the quality of the clay which confronts the teacher when she is ready to begin her work. This quality is not always evident from external observation and is sometimes very difficult to determine by means of the common form of analysis and test.

The second object of the study is to make a comparison of the mental age with other data for each child in order to determine the classification and the treatment which best fits his needs at the present time.

The third object of the study is to offer predictions as to the probable advancement of each child through the primary grades,—this prediction being based primarily on the potential mental capacity as shown by the mental test. It is hoped that many of these children may be found two or three years hence and the results of these predictions checked. (The tables for these predictions are so extensive that they cannot be published in this pamphlet but may be found in the original thesis in the library at Stanford University.)

Plans and Method of Procedure

The work of gathering data and making tests began the first week after the holiday vacation in January, 1917. Most of the children were just then entering school.

The first problem was to find schools in which the superintendent and the teachers were willing to cooperate in gathering data and in allowing the tests to be made under favorable conditions. The next problem was to get a sufficient number of rooms to represent the various types commonly found in school work, and to find them within twenty miles from the University. The latter point was necessary in order that the numerous visits required to do the testing and to gather the data might neither cost too much nor consume too much time.

After the plan was laid before the superintendent and the teacher concerned and they were found willing to cooperate in the study, the teacher was asked to fill out certain blanks with supplementary data. (To be explained under another heading.) The

teacher was also requested to say nothing, or as little as possible about the study. It was entered as a regular part of the school work and was to arouse as little as possible of curiosity or comment. When the time for testing came the teacher simply said, "Children this is Mr. D. and he has some pictures and blocks to show you and some questions to ask you. Each one of you will have a chance to go with him to the library (or the room given for the testing) to see his pictures, but only one can go at a time. Who wants to go first?" The result was always the same. Children vied with one another for an early chance to see the pictures. The experimenter usually returned to the room with the child who had been tested and took the next subject with him to the testing room. On the way conversation with the child nearly always established a naturalness and freedom which made it possible to begin the test at once. If the child still seemed timid when the room was reached, the accidental dropping of the pennies or the blocks or other of the test materials to scatter over the floor brought assistance from the little worker in such a way that rapport was quickly established and the tests were well under way and a natural interest awakened in what was to follow, by the time the material was reassembled. Not a child of the 150 tested held aloof for more than a few minutes. Some indeed, became veritable chatterboxes to be held in restraint, and some didn't want to leave when the tests were finished.

Who Were Tested

The children tested embrace all those found working in the first grade in five different school rooms in different vicinities. These rooms were selected to include what would appear to constitute a normal variety of first grade conditions. Two rooms are in Redwood City. The children here represent all social classes. In one room most of the children are of foreign descent—chiefly Spanish and Italian. The other room represents a common mixture of races with American predominating. One room is in the town of Santa Clara where the conditions are similar to those of Redwood City. The children in this room are chiefly of foreign descent but introduce the Portuguese element as well as the Spanish and the Italian. One room is in Palo Alto, a University town of 5,000 inhabitants. The children here are from the middle and upper social classes and represent chiefly American parentage. One room is in Los Altos which is a well-to-do residential district. Most of the children in this room are of American descent. This room has in it three grades: 1st, 2nd, and 3rd. Only the 14 children working in the first grade were tested. In all, the study embraces 150 children—41 from the high 1st, and 109 from the low 1st grade. Most of those in the low 1st were tested within six weeks of the time of their entrance into school. No one, however, was tested within three days of the time he entered school.

How the Testing Was Done

Each child was tested alone in a quiet room. The Stanford Revision of the Binet-Simon Scale was used*. Sufficient time was taken to give the complete scale and to extend the tests well above and well below the average mental level which the child seemed to show. Extreme care was taken that the tests be both given and graded according to the standards set for this series. Previous to the time of beginning this study the writer had taken a course in Mental Testing under Dr. Lewis M. Terman and had tested approximately 100 children under his direction. The tests, therefore, will follow closely the standards as set by Professor Terman.

Supplementary Data

Each teacher entered the study in the spirit of hearty cooperation. Hours of time were spent by each in order that the supplementary data concerning the children might be as accurate and as scientific as possible. For the points which required rating or grading the teacher usually took four or five weeks to study the child after the blanks were submitted and before the ratings were made. Following are the points upon which the teachers gave estimates and collected data:

Name of the pupil; grade (high or low); age in years and months; date of entering school; quality of school work each child is doing rated on a scale of five;* teacher's estimate of the child's intelligence as compared with average children of the same age, this also rated on the scale of five, †occupation of the father; nationality of the father; nationality of the mother.

On another blank the teacher was asked to rate each child, using the scale of five, on the following twenty-four traits of personality:

(1) Power to give sustained attention, (2) persistence, (3) social adaptability, (4) leadership, (5) initiative, 6) evenness of temper, (7) emotional self-control, (8) physical self-control, (9) will power, (10) cheerfulness, (11) courage, (12) sense of humor, (13) obedience, (14) conscientiousness, (15) dependability, (16) intellectual modesty, (17) unselfishness, (18) cooperativeness, (19) speed, (20) industry, (21) personal appearance, (22) popularity among fellows, (23) talkativeness, (24) accuracy.

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* Found in "The Measurement of Intelligence," by Dr. Lewis M. Terman; published by Houghton-Mifflin Co.

† 1—very superior; 2—superior; 3—average; 4—inferior; 5—very inferior.

Chapter II

THE DIFFERENCES THAT WERE DISCOVERED

It is thought best to give each child a number and each room a letter by which each shall be known throughout the study. The key giving the proper name associated with each is in the possession of the Educational Department of Stanford University.

The tables on the following pages are arranged to portray certain facts and differences discovered by the study. Very little discussion of the tables will be given in this chapter, but the facts will be analyzed in some detail in connection with chapter three.

Table No. 1 — Room A

Number of Child	Sex *	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
1	b	5-10	6-10	117	2½	2	L	½	N. E.
2	b	5-9	6-6	113	2	2	L	½	N. E.
3	b	5-10	6-0	103	3	3	L	½	Am.
4	g	6-8	7-0	105	3	3	H	½	N. E.
5	b	5-11	6-2	104	3	3	L	½	I.
6	g	5-10	6-0	103	3	3	L	½	I.
7	b	6-0	6-4	105	3	3	L	½	N. E.
8	g	6-8	6-10	102	3	3	L	1	N. E.
9	g	7-3	7-2	99	3	3	H	1½	A.
10	g	6-7	6-4	96	3	3	L	1	I.
11	b	7-7	7-5	98	3	3	H	1½	A.
12	b	6-8	6-8	100	3	3	L	1	I.
13	b	7-4	7-0	95	4	4	H	1½	N. E.
14	g	7-0	6-6	92	4	4	H	1½	A.
15	b	6-4	5-7	88	3	3	L	1	I.
16	g	6-7	6-0	91	3	3	L	1	P.
17	b	6-9	6-2	91	3	3	L	½	A.
18	b	7-8	6-10	89	4	4	H	1½	I.
19	b	7-4	6-6	88	4	4	L	1	.....
20	b	6-2	5-4	86	4	3	L	½	A.
21	b	8-2	6-8	81	4	4	L	2	S.
22	g	7-5	6-0	81	4	4	H	1½	S.
23	b	6-2	5-0	81	5	4	L	½	P.
24	g	6-6	5-4	82	3	3	L	1	I.
25	b	6-11	5-7	84	3	3	L	1	I.
26	b	6-10	5-6	80	4	3	L	1	I.
28	g	6-1	4-10	79	4	4	L	½	N. E.
29	g	6-3	4-8	74	5	5	L	1	A.
30	g	6-1	4-8	76	5	5	L	½	S.
31	b	6-1	4-8	76	5	5	L	½	I.
32	b	8-0	6-0	75	3	4	H	1½	A.
32½	b	8-6	6-4	74	4	4	H	1½	I.
33	b	7-7	5-4	70	5	5	L	1½	P.
34	b	6-11	5-3	76	4	4	L	1	A.
35	g	10-0	5-1	51	5	5	H	3½	A.
36	b	10-1	4-6	45	5	5	L	4	A.
37	b	11-0	6-10	62	3	3	H	4	A.
38	b	6-0	4-8	77	4	4	L	½	A.

* Under "Sex" b means boy, g means girl. I. Q. means intelligence quotient. School work means the general average of school success as rated by the teacher.

The teacher's estimate of intelligence is based upon the child's general mental ability as compared with average children of the same age. Under Gr. L means low first grade, H means high first. Under Time in School ½ means the first half-year in school, 1 means that the child is now in the second half-year in school, 1½ means that he is now in the third half-year in school, etc. Under Nationality N. E. means North European, A means American, I means Italian, S means Spanish, P. means Portuguese.

Table No. 2 — Room B

Number of Child	Sex	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
39	b	6-3	8-4	133	1	1	L	½	A.
40	b	6-5	6-5	100	3	3	H	1	I.
41	b	6-2	6-10	110	2	2	L	½	A.
42	b	7-5	6-11	93	4	3	H	1	I.
43	g	6-8	6-0	90	4	4	L	½	I.
44	g	7-2	6-4	88	3	4	H	1½	S.
45	g	7-4	6-4	86	4	4	L	½	S.
46	g	7-8	6-6	85	4	4	H	2	S.
47	b	5-7	4-8	83	4	4	L	½	I.
48	g	8-3	6-10	82	3	4	H	2½	S.
49	b	5-11	4-10	82	4	5	L	½	I.
50	g	5-8	4-8	82	5	5	L	½	S.
51	b	7-0	5-9	82	3	3	H	1	I.
52	g	7-11	6-6	82	3	4	H	2½	S.
53	g	6-7	5-4	81	3	3	L	½	S.
54	g	6-3	5-0	80	4	4	L	½	S.
55	b	8-9	7-0	80	4	4	H	1½	S.
56	g	6-3	4-10	77	3	4	L	½	I.
57	g	6-2	4-8	76	5	5	L	½	S.
58	b	7-11	6-0	76	3	4	L	½	S.
59	g	7-9	5-8	75	4½	4	L	1½	S.
60	g	5-11	4-4	73	4	4	L	½	S.
61	b	6-11	5-0	72	3	4	L	½	S.
62	g	8-10	6-4	72	3	4	H	2½	I.
63	b	7-11	5-8	71	4	3	H	1½	A.
64	b	8-4	5-10	70	5	4	L	2	I.
65	b	6-1	4-2	69	5	5	L	1	S.
66	g	9-10	6-9	69	3	4	H	3½	S.
67	g	6-10	4-8	68	3	3	L	½	I.
68	g	7-10	5-4	68	4	4	L	½	S.
69	g	6-4	4-2	66	4	4	L	½	S.
70	b	10-1	6-6	66	3	4	H	2	S.
71	g	5-9	3-8	64	5	4	L	½	S.
72	b	5-9	3-6	64	5	4	L	½	S.
73	b	9-8	5-11	61	5	5	L	½	S.
74	g	6-10	4-0	58	5	5	L	½	I.
75	g	7-2	4-0	56	5	5	L	½	S.
76	b	10-5	5-7	54	5	5	H	2½	S.
77	b	5-10	3-0	51	5	4	L	½	S.

Table No. 3 — Room C

Number of Child	Sex	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
78	b	5-11	7-1	119	2	2	L*	½	N. E.
79	g	6-0	7-0	117	1	2	.....	½	A.
80	b	6-5	7-0	109	2	3	.....	1	P.
81	g	6-2	6-8	108	3	3	.....	½	A.
82	g	6-11	7-2	103	2	3	.....	½	P.
83	b	6-4	6-6	102	3	3	.....	½	A.
84	b	6-1	6-10	95	4	3	.....	½	A.
85	b	7-5	7-0	94	3	3	.....	½	P.
86	g	7-2	6-8	93	3	3	.....	½	P.
87	g	6-1	5-8	93	3	3	.....	½	N. E.
88	b	8-2	7-6	91	2	3	.....	2	S.
89	g	7-10	7-2	91	3	3	.....	1	P.
90	b	6-6	5-10	90	3	3	.....	1	P.
91	b	7-4	6-6	89	3	3	.....	1	S.
92	g	7-2	6-4	88	3	3	.....	1	P.
93	g	8-4	7-0	84	3	3	.....	3	S.
94	g	6-10	5-8	83	4	5	.....	1	S.
95	b	6-3	5-2	83	4	4	.....	½	P.
96	b	7-3	5-11	81	4	4	.....	½	S.
97	b	8-5	6-8	79	4	4	.....	2	I.
98	b	8-0	6-4	79	4	4	.....	2	P.
99	g	7-7	5-8	75	3	4	.....	2	P.
100	b	7-11	5-10	73	4	4	.....	1	S.
101	b	6-7	4-10	73	4	4	.....	1	P.
102	g	9-3	6-8	72	3	4	.....	2	S.
103	b	6-10	4-10	71	4	4	.....	1	P.
104	b	6-10	4-6	66	4	4	.....	1	S.
105	g	6-8	5-0	65	3	4	.....	1	P.
106	b	7-9	4-6	58	5	4	.....	½	P.
107	g	10-6	5-10	56	3	5	.....	1	P.

* All in Table 3 are in Low first.

Table No. 4 — Room D

Number of Child	Sex	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
122	g	7-6	10-11	145	1	1	H	½	A.
123	b	5-10	7-4	126	2	2	L	½	A.
124	g	6-5	8-0	124	4	3	L	1	A.
125	g	6-0	7-5	123	1	2	H	½	A.
126	g	6-4	7-8	121	3	3	L	1	A.
127	g	6-1	7-4	120	2	2	L	½	A.
128	g	6-1	7-4	119	3	3	L	½	A.
129	g	6-4	7-4	116	3	3	L	½	A.
130	g	5-11	6-10	115	3	3	L	½	A.
131	b	6-0	6-10	114	4	4	L	½	A.
132	b	6-4	7-2	113	2	2	L	½	Jap.
133	b	6-10	7-6	110	3	3	L	½	A.
134	g	6-10	7-6	110	3	3	L	1	I.
135	g	6-7	7-2	109	4	4	L	1	N. E.
136	g	6-2	6-8	108	3	3	L	1	A.
137	g	6-2	6-8	107	3	3	L	½	A.
138	b	6-11	7-4	106	4	4	H	1½	A.
139	g	6-10	7-2	105	3	4	L	1½	P.
140	b	6-8	6-10	102	3	3	L	1	S.
141	g	6-10	6-11	101	3	4	L	1½	P.
142	g	7-9	7-6	97	3	4	L	1	A.
143	b	6-2	6-0	96	4	3	L	½	A.
144	b	8-0	7-0	88	2	3	L	1	A.
145	b	6-2	5-4	87	5	5	L	½	A.
146	b	9-1	7-2	79	3	4	L	2½	P.
147	b	6-10	5-4	78	4	5	L	1	N. E.
148	g	6-7	4-10	73	5	5	L	½	A.
149	b	6-0	4-0	67	5	5	L	½	P.

Table No. 5 — Room E

Number of Child	Sex	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
108	g	6-9	9-6	142	1	1	H	1	A.
109	g	7-4	9-6	130	1	2	H	1	A.
110	b	6-8	8-7	129	2	1	H	1	A.
111	b	6-8	8-4	125	1	1	H	1	P.
112	b	7-3	8-5	116	2	3	H	1	A.
113	b	6-11	7-3	105	4	4	H	1	A.
114	g	6-0	7-0	117	1	2	H	1	A.
115	g	7-5	8-6	114	1	2	H	1	N. E.
116	b	6-8	6-8	100	4	3	H	2	P.
117	b	7-3	7-4	101	4	3	H	1	P.
118	b	6-9	6-10	101	3	3	H	1	A.
119	g	7-7	7-6	99	3	3	H	1	P.
120	g	6-6	6-4	97	2	3	H	1	A.
121	g	6-11	6-4	92	3	3	H	1	P.

The Differences in Different Rooms

A very brief summary of the conditions shown in the preceding tables will reveal the fact that not only are the individual differences great in each room, but the rooms themselves differ widely in the quality of intellect which each contains.

Room A has a rather general mixture of races with the North European and American predominating. The median I. Q. is 87* and the median mental age is 6 years 0 months. This means that one-half of the 38 children in this room have a very low mental level, classifying in the borderzone or feeble minded groups; and that one-half have a mental age so low that they can not be expected to do standard first grade work in a satisfactory manner. (See Chapter III for discussion of this point.) Three of the children are feeble minded and should not be allowed in the room.

Room B represents a most difficult problem. There are 39 children in the room. The median I. Q. is 76, the median mental age 5 yr. 7 mo. 14 are below 5 years mental age. Not more than 5 of the children in the room have really normal intelligence; 13 would undoubtedly classify as feeble minded, and 13 more are not far above the border line. The standard course of study is not adapted to the needs of these children and this teacher should not be judged by the progress her pupils make in their efforts to master it. From more than half of these children it is practically impossible to secure satisfactory first grade work now.

Room C is similar to room A but has fewer American children. The median I. Q. is 85 and the median mental age is 6 yr. 0 mo. One-half of these children have neither the mental age nor the intelligence level necessary to master the first grade work. 17 are now repeating the work and a similar number will be required to

* I. Q. stands for intelligence quotient. It represents the relation between chronological age and mental age and is found by dividing the chronological age by the mental age.

repeat again next term. Fully half of these children should not be attempting to do first grade work. Almost any legitimate work which they could do would be preferable.

Room D has 28 pupils. They are mostly of American parentage. The median I. Q. is 108.5, the median mental age 7 yr. and 2 mo. Note the contrast between this room and the three mentioned above. Nearly half of these children, if they were trained in a few essentials, could probably do standard second grade work. Most of the children here have a mental age fully a year beyond that which would be required to do satisfactory 1st grade school work. The teacher says that "this is not a strong class." Is it not possible that the requirements in this room are set too high for the first grade? That the pace is being set by those children who have superior mental level and who have a high mental age? Yet there are 4 in this room who are below 6 yr. mental age, and 1 who is probably feeble minded.

Room E has 14 first grade pupils. 7 of them are normal, and 7 are superior in intelligence. The teacher complained that "six of her pupils were not doing good work." She hoped "I might be able to help find the cause of the difficulties." It appears to me that the chief difficulty is apt to lie in the fact that these six normal children are measured by seven superior children, without making sufficient allowance for the fact that these superior children are from one to three years superior in mental age to the members of the normal group. Evidently "poor" in school work is a **relative** rather than an **absolute** term.

Table No. 6 gives a tabular comparison of the five rooms on twenty-five different points. There are many points of interest brot out by the facts presented by this table. I shall call attention to only one here. There is a natural tendency for the teacher to arrange her pupils according to a normal distribution in quality of school work regardless of the general average in intelligence or mental age found in her room. This fact is strongly evident when room C is compared with room D. There is a normal distribution of grades in both rooms. Exactly the same number of children is marked average or above in each room, notwithstanding the facts that the median I. Q. for room C is 85 and the median mental age is 6-0, while the median I. Q. for room D is 108.5 and the median mental age 7-2.

Table No. 7 gives a comparison of the five rooms with the pupils arranged according to intelligence level. Tables No. 6, 7 and 8 furnish data worthy of the careful study of school superintendents.

Table No. 6 — Showing Comparison of the Five Rooms in Which the Tests Were Made

	Room A	Room B	Room C	Room D	Room E
Number of pupils	38	39	30	28	14
Age range from	11 to 5-9	10-5 to 5-8	10-6 to 5-11	9 to 5-10	7-7 to 6-0
M. age range from	7-5 to 4-6	8-4 to 3-0	7-6 to 4-6	11 to 4-0	9-6 to 6-4
I. Q. range from	117 to 45	133 to 51	120 to 56	145 to 67	142 to 92
Median I. Q.	87	76	85	108.5	110
Median M. age	6-0	5-7	6-0	7-2	7-5
With I. Q. 110 or above	2	2	2	13	7
With I. Q. 95 to 109	11	1	5	9	6
With I. Q. 80 to 94	13	14	12	2	1
With I. Q. 70 to 79	9	9	7	3	0
With I. Q. 69 or below	3	13	4	1	0
M. age 7 yrs. or above	4	2	8	17	10
M. age 6 to 7 yrs.	19	13	7	7	4
M. age below 6 yrs.	15	24	15	4	0
M. age below 5 yrs. 6 mos.	12	18	6	4	0
M. age below 5 yrs.	6	14	4	2	0
No. of repeaters	21	14	17	13	1
American or N. E.	21	3	7	21	10
Portuguese	3	0	14	4	4
Spanish	3	26	8	1	0
Italian	0	10	1	1	0
No. marked 1 in S. work	0	1	1	2	5
No. marked 2 in S. work	2	1	4	4	3
No. marked 3 in S. work	17	13	14	13	3
No. marked 4 in S. work	12	13	10	6	3
No. marked 5 in S. work	7	11	5	3	0

Table No. 7 — A Comparison of the Five School Rooms—the Pupils Arranged According to Intelligence Quotient

I. Q.	Room A	Room B	Room C	Room D	Room E
135 — up	.....	.....	.....	1	1
130 — 134	.....	1	.....	.....	1
125 — 129	.....	.....	.....	1	2
120 — 124	.....	.....	.....	4	.....
115 — 119	1	.....	2	3	2
110 — 114	1	1	.....	4	1
105 — 109	2	.....	2	5	1
100 — 104	5	1	2	2	3
95 — 99	4	.....	1	2	2
90 — 94	3	2	6	.....	1
85 — 89	4	3	2	2	.....
80 — 84	6	9	4	.....	.....
75 — 79	6	4	3	2	.....
70 — 74	3	5	4	1	.....
65 — 69	.....	6	2	1	.....
60 — 64	1	3	.....	.....	.....
— 59	2	4	2	.....	.....
Total	38	39	30	28	14

NOTE: The black horizontal line in each column represents the median I. Q. for that room:

For Room A, it is 87
B, it is 76
C, it is 85
D, it is 108
E, it is 110

It is evident from this that the quality of intellect found in one room may differ greatly from that found in another room of the same grade.

Table No. 8 — A Comparison of 149 First Grade Children Classified According to Groups by I. Q. and by Mental Age

I. Q.	Total		Mental Age	Total	
135 — up	2		9-6 — up	3	
130 — 134	2		9-0 to 9-5	0	10%
125 — 129	3	17.4%	8-6 to 8-11	2	Superior
120 — 124	4	Superior	8-0 to 8-5	4	
115 — 119	8				
110 — 114	7		7-6 to 7-11	6	
			7-0 to 7-5	26	51.7%
105 — 109	10		6-6 to 6-11	30	Average
100 — 104	13		6-0 to 6-5	21	
95 — 99	9	49.9%			
90 — 94	12	Average	5-6 to 5-11	17	
85 — 89	11		5-0 to 5-5	14	38.2%
80 — 84	19		4-6 to 4-11	17	Low
			to 4-5	9	
75 — 79	15			149	
70 — 74	13				
65 — 69	9	32.9%			
60 — 64	4	Low			
— 59	8				
	149				

I have made the groupings in these two classifications purely by arbitrary divisions. However, I believe these divisions are sufficiently accurate to make plain the fact the first grade course of study is really adapted to the needs of only about one-half of the children found in the grade, that approximately one-third of the children can not comprehend the work given, and that approximately one-fifth of the children do not have the type of work necessary to make them use their mental abilities to anywhere near their normal capacity.

We need not be surprised at the differences shown in these tables. I am confident that they could be duplicated in many school systems. While authorities differ on the point, it seems to me that children whom we find in the first grade are apt to show individual differences as great as are to be found in almost any other grade of school work. One group is composed of the left-overs due to the failures during the past one, two, three, four, or five years. Some, in truth, started to school about the time their classmates were born. All are subject to a great variety of home environment and the children of the new group have not yet had the opportunity of mixing in the melting pot with children from everywhere by which contact a certain amount of amalgamation and lopping off of individual differences is bound to occur. The only measuring rod that has been applied to them is that of age. It is a well known fact that age does not satisfactorily bound individual differences.

It is, therefore, very important that the problem of discovering what these differences are and of making proper provision for them be attacked as early as possible and in the most scientific manner possible. Each child's future demands it. The attitude of each

toward school, toward work, and toward society is bound to be influenced by whether or not he is given the type of work for which he is fitted. The fact that forty children have all traveled over the roads of life for six years does not mean that they are all fitted for the same or even similar treatment in the first grade.

Chapter III

ANALYSIS AND STUDY OF THE DIFFERENCES

Mental Age and School Success

One of the very significant correlations is that of mental age with quality of school work, as rated by the teacher. This correlation is high—.725, Pearson formula—shown in table No. 9. We may infer from this that **mental age** may be taken as a fairly accurate index of what a child may be expected to do in his school work. In other words, we might expect, as a rule, that the child below six years mental age in the first grade would do unsatisfactory work; from six to seven years mental age, to do good work; and above 7 years mental age, to do superior work. It should be noted, however, that some other factors such as over-ageness, low mental level, and repetition may enter to complicate matters.

In this connection let us notice the relation between mental age and school work when there is a difference in chronological age. For this purpose I have selected first, all those children between six and seven years of age who tested at "normal" (I. Q. from 95 to 105). These are shown in table No. 10.

For the second group I selected all those who were between eight and nine years of age and who tested "dull" (I. Q. 75 to 85). These are shown in table No. 11.

There are sixteen children in the normal group and ten in the dull group. The average mental age for the normal group is 6 yr. 6 mo., of the dull group, 6 yr. 6 mo. The average I. Q. of the normal group is 100.7, of the dull group 77.8. The average chronological age of the normal group is 6 yr. 6 mo., of the dull group 8 yr. 4 mo. The average difference in chronological age is almost 2 years. The average mark for school work for the mental group is 3.12, for the dull group is 3.70. This is an advantage of .58 in favor of the normal group. It is very indefinite just what this advantage is. It does not matter. The evidence merely shows that the members of the normal group appear to do better school work than the members of the dull group (altho the difference is not great), notwithstanding the facts that the dull children are all repeaters, some of them for the third time, and they average two years older in chronological age than the normal children.

Table No. 9 — Showing Correlation of Mental Age With Quality of School Work

MENTAL AGE	QUALITY OF SCHOOL WORK					
	5	4	3	2	1	Total
9-6 — up					3	3
9-0 to 9-5						
8-6 to 8-11				1	1	2
8-0 to 8-5		1		1	2	4
7-6 to 7-11			5	1		6
7-0 to 7-5		6	10	7	3	26
6-6 to 6-11		9	18	3		30
6-0 to 6-5		6	14	1		21
5-6 to 5-11	3	7	7			17
5-0 to 5-5	4	6	4			14
4-6 to 4-11	8	7	2			17
— to 4-5	7	2				9
Total	22	44	60	14	9	149

Correlation .725 (Pearson)

What relation is there between the quality of school work of the **normal 6-year-old child** and the **dull** or **borderzone 8-year-old child?**

Table No. 10 — Normal 6-Year-Old Children

NUMBER OF CHILD	Age	M. Age	I. Q.	School Work	Gr.	Time in School	Nationality
83	6-4	6-6	102	3	L	½	A.
84	6-1	5-10	95	4	L	½	A.
40	6-5	6-5	100	3	H	½	I.
7	6-0	6-2	105	3	L	½	N. E.
143	6-2	6-0	96	4	L	½	A.
4	6-8	7-0	105	3	H	1½	N. E.
8	6-8	6-10	102	3	L	1	N. E.
10	6-7	6-6	96	3	L	1	I.
12	6-8	6-6	100	3	L	1	I.
82	6-11	7-2	103	2	L	½	P.
113	6-11	7-3	105	4	H	1	A.
116	6-8	6-8	100	4	H	2	P.
118	6-9	6-10	101	3	H	1	A.
120	6-6	6-4	97	2	H	1	A.
140	6-8	6-10	102	3	L	1	S.
141	6-10	6-9	98	3	L	1½	P.

Table No. 11 — Dull 8-Year-Old Children

NUMBER OF CHILD	Age	M. Age	I. Q.	School Work	Gr.	Time in School	Nationality
21	8-2	6-10	81	4	L	2	S.
32	8-0	6-0	75	3	H	1½	A.
32½	8-6	6-4	74	4	H	1½	I.
48	8-3	6-10	82	3	H	2½	S.
55	8-9	7-0	80	4	H	1½	S.
62	8-10	6-4	72	3	H	2½	I.
64	8-4	5-10	70	5	L	1	I.
93	8-4	7-0	84	3	L	3	S.
97	8-5	6-8	79	4	L	2	I.
98	8-0	6-4	79	4	L	2	P.

It may be that the alertness of the normal mind more than balances the two years of additional experience of the duller child at this age. All those in the dull group are rated by the teachers "4" in intelligence. Only two of those in the normal group are so rated (they are both repeaters). The rest are rated "3."

From this analysis we would conclude that, while mental age does indicate similar possibilities of accomplishment, yet the child in the first grade with a normal I. Q. is apt to have some advantage over the child of the same mental age but with a ¾ I. Q. (75). It would be natural to expect differences of greater or less degree to vary in proportion.

What Mental Age Is Necessary to do Satisfactory First Grade Work?

Earlier in the discussion we stated that we would expect the child below 6 years in mental age, as a rule, to do inferior first grade work. Of the 150 pupils included in this study 57 are under six years mental age; 22 of these are rated by the teacher "5" (very inferior); 22 are rated "4" (inferior); and 13 are rated "3" (average). Table No. 12 shows data concerning these 13 rated "3."

Eight children, Nos. 15, 24, 25, 90, 99, 105, 107, and 51, are repeating their work. Since the majority of these are not much over-age we might expect them, as repeaters, to do "average" work. Of the remaining five cases, one has an I. Q. of 93 and a mental age of 5-8 hence is practically normal, while four are associated in classwork with 26 other children, 13 of whom are either borderzone or feeble mentally. (Room B, table 2.) The I. Q.'s of these four stand in the central portion of the group of 26. Hence it would be rather natural for any teacher in such a situation to rate such children "average." She would likely rate them differently if she had them associated with a stronger group. Therefore, it is entirely probable that these children are not doing "average" first grade work.

It appears from this analysis that we cannot expect a child whose mental age is below six years to do satisfactorily the standard first grade work unless he is a repeater or is over-age. The latter

class may do satisfactory work but is more apt to be found in the inferior column.

What mental age is necessary to do satisfactory first grade work?

Table No. 12 — This Table Shows Data Concerning the 13 Children Who Are Below 6 Years in Mental Age Who Are Marked 3 or Average in Quality of School Work

NUMBER OF CHILD	Age	M. Age	I. Q.	School Work	Gr.	Time in School	Nationality
15	6-4	5-9	88	3	L	1	I.
24	6-6	5-4	82	3	L	1	I.
25	6-11	5-7	84	3	L	1	I.
87	6-1	5-8	93	3	L	½	N. E.
90	6-6	5-10	90	3	L	1	P.
99	7-7	5-8	75	3	L	2	P.
105	7-8	5-0	65	3	L	1	P.
107	10-6	5-10	56	3	L	2-|-	P.
51	7-0	5-9	82	3	H	1	I.
53	6-7	5-4	81	3	L	½	S.
56	6-3	4-10	77	3	L	½	I.
61	6-11	5-0	72	3	L	½	S.
67	6-10	4-8	68	3	L	½	I.

Why are children of 6 year mental age sometimes marked unsatisfactory or inferior in school work?

Table 14 is arranged to show data concerning all the children found (22) whose mental age was 6 years or over and whose school work was rated "4" or inferior. 13 are below 95 in I. Q., hence, should be rated dull-normal or below average in ability. In a normal distribution we would expect some if not all of these to be rated below average. It may be that these children have the actual capacity to understand their work and do it in average fashion but that they, being dull, suffer by way of comparison with brighter intellects. Nos. 116, 117, and 113 have I. Q.'s of 100, 101, and 105, respectively. They should be, and probably are doing satisfactory work of first grade standard, but they are associated in class work with other children of one or two years higher mental age. (See room E.) These children probably suffer by comparison.

There are six children in whom the mental tests appear to show no cause for inferior work. These are Nos. 143, 131, 138, 135, 124, and 13. No. 13 is reported by the teacher as a dreamy, uninterested boy. It is likely that the school work has not struck any chord of interest in this boy's life. He may wake up some day to do satisfactory work. His problem should be studied. The other five children are in room D. The I. Q.'s average high. There are several causes that might enter to produce their inferior school marks, such as absence, ill health, spoiled nature, poor attention to work, lack of harmony of feeling, etc. However, it may be that these pupils again suffer by comparison with an older mental-age group. The

average mental age for this group is 6 years 5 months while for the class as a whole it is 7 years and 2 months. It is also evident from the study that the teacher of room D rates lower in quality of school work for the same mental ability than do the teachers of the five rooms as a whole. The median I. Q. of all the children rated 4 by all the teachers is 82; the median I. Q. of all the children rated 4 by this teacher is 107.

Therefore, it appears that if proper allowance were made for standards of grading, very few of the children who are six years or over mental age would be marked inferior.

Taking the 150 children as a whole, both the quality of school work and the I. Q. are low for the children of low mental age. 40 pupils are below 5½ years mental age. Very few, if any, of these can do standard first grade work.

On the other hand, 26 pupils are between 7 and 8 years, and 10 pupils above 8 years mental age. Many of the 26 and all of the 10 could probably do satisfactory second or third grade work after a very little coaching. It is significant that no child above 6 mental age is marked by the teacher "inferior" in school work.

Table No. 14 — To Show Why Unsatisfactory Work, Marked 4 by the Teacher, Is Recorded Against 22 Children Whose Mental Age is Six or Above

NUMBER OF CHILD	I. Q.	Age	Mental Age	Grade	Time in School	Teacher's Estimate of Intel.	Nationality
124	124	6-5	8-0	L	1	3	A.
135	109	6-7	7-2	L	1	4	N. E.
138	106	6-11	7-4	H	1½	4	A.
113	105	6-11	7-3	H	1	4	A.
117	101	7-3	7-4	H	1	3	P.
13	96	7-4	7-0	H	1½	4	N. E.
55	80	8-9	7-0	H	1½	4	S.
131	114	6-0	6-10	L	½	4	A.
116	100	6-8	6-8	H	2	3	P.
14	93	7-0	6-6	H	1½	4	A.
18	89	7-8	6-10	H	1½	4	I.
21	82	8-2	6-8	L	2	4	S.
97	80	8-5	6-8	L	2	4—	I.
143	96	6-2	6-0	L	½	3—	A.
42	93	7-5	6-11	H	1	3	I.
43	90	6-8	6-0	L	½	4	I.
19	89	7-4	6-6	L	1	4	.....
45	86	7-4	6-4	L	½	4	S.
46	85	7-8	6-6	H	2	4	S.
22	81	7-5	6-0	H	1½	4	S.
98	79	8-0	6-0	L	2	4—	P.
32½	75	8-6	6-4	H	1½	4	I.

Table No. 16 — Correlation Between Chronological Age and Quality of School Work

CHRONOLOGICAL AGE	SCHOOL WORK					
	5	4	3	2	1	Total
10-6 to 10-11	1	.....	2	.....	.....	3
10-0 to 10-5	1	1	1	.....	.....	3
9-6 to 9-11	1	.....	1	.....	.....	2
9-0 to 9-5	.....	.....	2	.....	.....	2
8-6 to 8-11	.....	2	1	.....	.....	3
8-0 to 8-5	1	3	3	2	.....	9
7-6 to 7-11	2	6	8	.....	1	17
7-0 to 7-5	1	8	7	1	2	19
6-6 to 6-11	2	12	19	3	2	38
6-0 to 6-5	8	10	13	4	4	39
5-6 to 5-11	4	3	3	4	.....	14
Total	21	45	60	14	9	149

Correlation .037

This is a negative correlation which means that the older children do a poorer quality of school work. We would very naturally infer from this that the older children who represent the retarded group, by age standards, must on the average be duller than those who are at age for the grade. There appears to be a close association between retardation and dullness or quality of school work. This question is discussed more fully under the topic "What is the principal cause of retardation?"

As a rule, the younger children in the first grade have the higher marks in school work and also the higher I. Q.'s. Very few of those who are above 7 years, and none of those above 8 years of age, have a **normal** mental level. It is rather remarkable that, out of 56 children above 7 years of age, only 5 are doing better than average (3) work. The older children are doing poor work, as a rule, altho most of them are repeaters.

Table No. 17 — Correlation Between Intelligence Quotient and Quality of School Work

I. Q.	SCHOOL WORK				
	5	4	3	2	1
130 — up	.....	.....	.....	.....	3
125 — 129	.....	.....	.....	2	1
120 — 124	.....	1	1	1	2
115 — 119	.....	.....	3	3	2
110 — 114	.....	1	2	3	1
105 — 109	.....	3	6	1	.....
100 — 104	.....	2	10	1	.....
95 — 99	.....	3	5	1	.....
90 — 94	.....	3	8	1	.....
85 — 89	1	5	4	1	.....
80 — 84	2	10	7	.....	.....
75 — 79	3	7	5	.....	.....
70 — 74	4	5	3	.....	.....
65 — 69	2	4	4	.....	.....
60 — 64	3	.....	1	.....	.....
— 59	7	.....	1	.....	.....
Total	22	44	60	14	9

Correlation .710

The correlation between intelligence quotient and quality of school work is lower than that between mental age and school work. This is what we might expect, for a few children whose I. Q.'s are high are very young and have a mental age barely equal to mastering average first grade work. Several whose I. Q.'s are very low are repeaters in the grade, hence may be able to do average class room work. These conditions would tend to lower the correlation.

The median I. Q. for all children marked 1 is 125; marked 2 is 113; marked 3 is 92; marked 4 is 82; marked 5 is 69.

Sixty pupils are marked 3 in school work as follows:

4 pupils	between 5½ and 6	years of age—Median I. Q.	103
13 pupils	between 6 and 6½	years of age—Median I. Q.	105
18 pupils	between 6½ and 7	years of age—Median I. Q.	94
7 pupils	between 7 and 7½	years of age—Median I. Q.	91
8 pupils	between 7½ and 8	years of age—Median I. Q.	86
10 pupils	between 8 and above	- - - Median I. Q.	72

The older pupils may be rated the same in school work but the I. Q. is lower as the age increases.

Table No. 18 is arranged for the study of certain sex differences.

There are seventy-nine boys and seventy-one girls, making the groups closely comparable. The median I. Q. of the boys is 86; for the girls 91.

44 of the boys or 57% of the total are below average in school work.
23 of the girls or 32% of the total are below average in school work.
28% of the boys and 53% of the girls are average in school work.
16% of the boys and 14% of the girls are above average in school work.

The girls predominate in the average group while the boys predominate in both the "below average group" and the "above average group." However, more girls are found in the highest group.

Of the 33 cases of retardation by age, mentioned elsewhere in the study, 19 are boys and 14 are girls—24.0% and 19.7%, respectively—which is a difference of 4.3% in favor of the girls. This is exactly the same as the average difference in percentage found by Ayers in a study of retardation in the Elementary Grades of 15 American cities.

In order to make some comparisons with the two groups under as nearly the same conditions as possible, I have selected for one group all the boys who tested normal in I. Q. and for another group, all the girls who tested normal (95 to 105 I. Q.). Table No. 19 shows data concerning the boys, and table No. 20 concerning the girls. There are 15 boys and 11 girls.

	For Boys	For Girls
The average I. Q. is.....	100.5	100.8
The average chronological age is..	6 yr. 8 mo.	6 yr. 9 mo.
The average mental age is.....	6 yr. 8½ mo.	6 yr. 10 mo.
The average rating in work.....	3.40	2.81

It is evident that, when the mental level, chronological age, and mental age are almost identical, the girls still have the advantage of the boys in ability to get good school marks. The difference in favor of the girls in this case being .60 which is a little more than one-half of one step in the five-point scale of grading. It will also be noted that the girls of normal ability average above average in school marks (2.81 vs. 3), while the boys of normal ability average below average in school marks (3.40 vs. 3).

Table No. 18 — Showing a Comparison of Boys and Girls With Reference to I. Q. (on the perpendicular scale) and Quality of School Work (horizontal scale) As Rated by the Teacher

I. Q.	BOYS						GIRLS					
	SCHOOL WORK						SCHOOL WORK					
	5	4	3	2	1	Total	5	4	3	2	1	Total
140	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	2
130	.....	.....	.....	.....	1	1	.....	.....	.....	.....	1	1
120	.....	.....	.....	2	1	3	.....	1	1	1	1	4
110	.....	1	1	6	.....	8	.....	.....	4	.....	3	7
100	.....	4	7	1	.....	12	.....	1	8	1	.....	10
90	.....	4	4	1	.....	9	.....	2	10	1	.....	13
80	2	11	4	1	.....	18	1	5	7	.....	.....	13
70	3	10	4	.....	.....	17	4	3	4	.....	.....	11
60	4	1	2	.....	.....	7	1	2	3	.....	.....	6
50	3	.....	.....	.....	.....	3	2	.....	1	.....	.....	3
40	.....	1	.....	.....	.....	1	1	.....	.....	.....	.....	1
Total	12	32	22	11	2	79	9	14	38	3	7	71

Table No. 19 — This Table Shows Data Concerning All of the Boys Whose Intelligence Quotients Were Between 95 and 105

NUMBER OF CHILD	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
3	5-10	6-0	103	3	3—	L	½	A.
5	5-11	6-2	104	3	3+	L	½	I.
7	6-0	6-4	105	3	3	L	½	N. E.
11	7-7	7-5	98	3	3	H	1½	A.
12	6-8	6-8	100	3	3	L	1	I.
13	7-4	7-0	95.6	4	4	H	1½	A.
83	6-4	6-4	102.5	3	3	L	½	A.
84	6-1	5-10	95.8	4	3	L	½	A.
113	6-11	7-3	105	4	4	H	1	A.
116	6-8	6-8	100	4	3	H	2	P.
117	7-3	7-4	101	4	3	H	1	P.
118	6-9	6-10	101	3	3	H	1	A.
119	7-7	7-6	99	3	3	H	1	P.
140	6-8	6-10	102.5	3	3	L	1	S.
143	6-2	6-0	96	4	3—	L	½	A.

Table No. 20 — Showing Data Concerning All of the Girls Whose Intelligence Quotients Were Between 95 and 105

NUMBER OF CHILD	Age	Mental Age	I. Q.	School Work	Teacher's Estimate of Intel.	Gr.	Time in School	Nationality
4	6-8	7-0	105	3	3-|-	H	1½	N. E.
6	5-10	6-0	103	3	3	L	½	I.
8	6-8	6-10	102.5	3	3—	L	1	N. E.
9	7-3	7-2	99	3	3	H	1½	A.
10	6-7	6-4	96	3	3	L	1	I.
40	6-5	6-5	100	3	3	H	1	I.
82	6-11	7-2	103.5	2	3-|-	L	½	P.
120	6-6	6-4	97.5	2	3	H	1	A.
139	6-10	7-2	105	3	4	L	1½	P.
141	6-10	6-11	101	3	4	L	1½	P.
142	7-9	7-6	97	3	4	L	1	A.

All the evidence seems to point to the same fact: that boys do not succeed as well in school work as girls do. What is the reason? It may be that the school curriculum is better adapted to the needs and interests of girls; that girls have more industry and better application; that girls more willingly submit to direction in a "task," that is, have less rebellious minds with reference to school work; that girls are better behaved than boys and that school marks reflect some influence of behavior; that teachers (all women) are better suited to teaching girls than boys; or it may be any one or a combination of many of the causes that might be mentioned. At any rate, the differences due to sex are worthy of careful study and experimentation.

The Correlation Between Intelligence Quotient and Social Status.

The children were classified as to social status by the occupation of the father (Taussig's classification).

The correlation between I. Q. and social status is .48 (Pearson). This means that the lower intelligence quotient is more apt to come from the lower social classes than from the upper, or stated in another way, low grade intelligence does not come so frequently from the upper social classes. The median I. Q. for the lowest two classes (4 and 5) falls in the group 80 to 84; for classes 2 and 3, in group 105 to 109; for the highest class (1), in group 115 to 119. It should be noted, however, that some very bright children are found in the lower social classes, and a few low cases are found in the upper social groups. The genius who comes from the lower group is apt to be conspicuous.

Table No. 22 — A Comparison of the Intelligence Quotients of Pupils of Different Nationalities

	Spanish	Portuguese	Italian	N. European	American
130 — up					5
125 — 129				2	1
120 — 124					4
115 — 119				1	7
110 — 114			1	2	3
105 — 109		2		—3	—5
100 — 104	1	2	5	1	3
95 — 99		1	1	1	7
90 — 94	1	6	2	1	2
85 — 89	4		2		4
80 — 84	11	—2	—6		
75 — 79	—4	3	3	3	3
70 — 74	4	3	3		2
65 — 69	6	2	1		
60 — 64	3				1
— 59	3	2	1		2
Totals	37	23	25	14	49

The median I. Q. for the Spanish children lies in group 75 to 80.
The median I. Q. for the Portuguese children lies in group 80 to 85.
The median I. Q. for the Italian children lies in group 80 to 85.
The median I. Q. for the N. European children lies in group 105 to 110.
The median I. Q. for the American children lies in group 105 to 110.
The median I. Q. for the entire group is 89.

Table No. 23 — To Show Retardation by Age

AGE	GRADE ONE	
	Low	High
5-6 to 5-11	15	3
6-0 to 6-5	35	
6-6 to 6-11	27	11
7-0 to 7-5	8	11
7-6 to 7-11	11	7
8-0 to 8-5	7	2
8-6 to 8-11		3
9-0 to 9-5	2	
9-6 to 9-11	1	1
10-0 to 10-5	1	2
10-6 to up	2	1
Total	109	41

Those who have reached the age of 7 yr. 6 mo. and are still in the low 1st, and those who have reached the age of 8 yr. and are still in the high 1st grade are considered retarded.

The 33 cases below the zigzag line are retarded according to age-grade distribution.

Retardation by Age

Table No. 23 shows the age-grade distribution of the 150 children tested.

All the figures below the zig-zag line represent retarded children —in number, 33 which is 22% of the total enrollment. In the low first grade 22% of the children are retarded. In the high first grade 21.9% of the children are retarded.

These percentages are slightly lower than those found in the Salt Lake City survey which are as follows:

Retarded in high 1st	20.7%
Retarded in low 1st	38.3%
Average	29.5%

What Causes Retardation?

While it is important that we know the amount of retardation, it is doubtless of much greater importance that we find the causes of retardation. Leonard P. Ayers, in "Laggards in Our Schools" speaks as follows: "Since retardation is ascribable to only two conditions, late entrance and slow progress, and since late entrance is found to be only a small factor (affecting less than one-third) * * * slow progress, however caused, is proved to be the great factor in bringing about the existing condition. * * * There is no one cause for retardation, **nor can we say that any one cause is preponderant** (the bold face type is my own). Late entrance is a potent factor, irregular attendance is another. * * * Certain physical defects are responsible for a part of the backwardness." Under the heading "Remedies" he suggests two phases, legislative and executive. Under legislative he includes: better compulsory attendance laws, better enforcement of the same, better laws for the taking of the school census, better agreement between the length of the school course and the length of the compulsory attendance period. Under administrative reforms, he includes: better medical inspection, courses of study which more nearly fit the abilities of the average pupil, more flexible grading, and a better knowledge of the facts.

In the introduction to the book, "Laggards * * *," Dr. Gulick says, "The most significant of the findings are: (1) **That the most important causes of retardation of school children can be removed.**" * * *

This point of view seems to be rather generally accepted among educators: viz., that the causes of retardation can be removed. We wish to take issue with this point of view. Let us examine the data concerning the 33 cases of retardation found in this study. See Table No. 24—"To show causes of retardation."

For purposes of classification the children are divided into three groups: (1) Those who entered late, (2) those who entered at normal age but show slow progress, (3) those who show both late entrance and slow progress. At normal age means within six months of the time when the child is six years old.

Five of these retarded children show late entrance, eighteen entered at normal age but progressed slowly, ten show both late entrance and slow progress.

Of the five children who show late entrance, only one, No. 119, has normal mental ability (I. Q. 99). She has made regular progress since entering school and is now doing work of average quality. The remaining four are sub-normal children mentally, belonging either in the feeble-minded or in the borderzone group. The very fact that these four children have a low mental level is the most probable cause of their late entrance into school, hence the most probable cause of their retardation. They are all failing in their work at present and will be repeaters next term—still further retarded.

Eighteen children show entrance at normal age, but slow progress. All of these are repeaters, several for the third or fourth time. The mental level of each one is low. Four are probably feeble-minded, the rest would classify in the borderzone or in the dull mental groups. Only one (I. Q. 91.7) even approaches the normal mental level. This one as rated by the teacher is the best one of the eighteen in ability to accomplish school work.

Ten children show both late entrance and slow progress. Eight of these have low mentality; one has a mental level approaching the normal (91.4 I. Q.) and is now doing average work; one has a normal mental level (97 I. Q.) and the data at hand does not suggest any cause of retardation.

Of the total number (33) of retarded children, only two have normal mental ability as shown by the psychological tests. Stated in another way, 93.9% of all the retardation shown by the age-grade chart of these five rooms, is found in children of low mental level. It seems to me that this is a very significant fact, and one that has not been established by any former study. While there may be contributory causes low mentality is undoubtedly the **chief cause** of retardation in these five rooms of first grade children.

I predict that we shall soon discover that there is **"one cause of retardation that is preponderant,"** and that that cause is **low mental level.** If this be true, can **"the most important causes of retardation of school children be removed?"** This can happen only if we can change a low mental level to a much higher mental level in the same individual. Very few, if any, educators would argue that this can be done.

While, as a rule, we can not remove the **cause** of retardation, we can, and probably should, remove the **retardation itself.** These retarded pupils should be moved on in some form of work which will best fit their needs. They should not be made to mark time on work which they can not master, or which, if finally mastered, will be of little practical use to them. Under the present organization of school systems in general, nearly all of these pupils (22%* of the

* Ayers found that 22% of the children enrolled in the city schools of Cleveland in 1915 were in this "over age, slow group." "Child Accounting in the Public Schools," Ayers.

total enrollment) will continue in school, during the compulsory period, both over age and slow in progress. This is the group which constitutes the greatest problem in the administration of the school, and will later constitute the greatest problem for society. We have found the group now, in the first grade. What is the school—what is society going to do for it?

Table No. 24 — To Show Causes of Retardation

No.	Age	Mental Age	I. Q.	School Work	Tr.'s Est. of Intel.	Gr.	Time in School	Nat.	Sex	
58	7-11	6-0	76	3	4	L	½	S	b	
68	7-10	5-4	68	4	4	L	½	S	g	5 entered late.
73	9-8	5-11	61	5	5	L	½	S	b	
106	7-9	4-6	58	5	4—	L	½	P	b	
119	7-7	7-6	99	3	3	H	1	P	g	
21	8-2	6-8	81.5	4	4	L	2	S	b	
32	8-0	6-0	75	3	4	H	1½	A	b	
33	7-7	5-4	70.3	5	5	L	1½	P	b	
35	10-0	5-1	51	5	5	H	3½	A	g	
36	10-1	4-6	45	5	5	L	3½	A	b	
37	11-0	6-10	62	3	3	H	4	A	b	
48	8-3	6-10	82	3	4	H	2½	S	g	
55	8-9	7-0	80	4	4	H	1½	S	b	18 show slow progress, but normal entrance.
59	7-9	5-8	75	4	4	L	1½	S	g	
62	8-10	6-4	72	3	4	H	2½	I	g	
64	8-4	5-10	70	5	4	L	2	I	b	
66	9-10	6-9	69	3	4	H	3½	S	g	
88	8-2	7-6	91.7	2—	3	L	2	S	b	
93	8-4	7-0	84.2	3	4	L	3	S	g	
97	8-5	6-8	79.5	4	4—	L	2	I	b	
98	8-0	6-4	79	4	4—	L	2	P	b	
99	7-7	5-8	75	3—	4	L	2	P	g	
146	9-1	7-2	79	3	4	L	2½	P	b	
76	10-5	5-7	54	5	5	H	2½	S	b	
89	7-10	7-2	91.4	3	3	L	1	P	g	
100	7-11	5-10	73.7	4	4	L	1	S	b	
102	9-3	6-8	72	3	4	L	2	S	g	
105	7-8	5-0	65	3	4	L	1	P	g	
107	10-6	5-10	56	3	5	L	1	P	g	10 show both late entrance and slow progress.
142	7-9	7-6	97	3	4	L	1	A	g	
144	8-0	7-0	88	2	3	L	1	A	b	
32½	8-6	6-4	74.5	4	4	H	1½	I	b	
70	10-1	6-6	66	3	4	H	2	S	b	

Chapter IV

TIME, ENERGY, AND MONEY LOST UNLESS ADJUSTMENT IS MADE ACCORDING TO INDIVIDUAL DIFFERENCES

What lessons are to be drawn from the analysis of the individual differences set forth in Chapters II and III? The average teacher has rather a set task before her. Thirty or forty pupils are placed in her room; she is given a course of study often rigid and definite in requirements, and a certain term in which to work. She is expected to have at least a very large percentage of her pupils master

the required work in the required time. If she succeeds, she is heralded as a successful teacher. If she fails, very few people, either patrons or school men, try to discover whether or not the failure is due to the **quality of the clay** with which she works. (Compare room B with rooms D and E.) This is grossly unfair to the teacher and usually results in gross injustice to the pupils. Seldom is any premium placed upon the ability and the skill necessary to recognize and handle properly individual differences. The result is a deadening, and dull uniformity produced by the loss of individual effort of both teachers and pupils.

This will continue until the school administration assists the teacher, in a scientific manner, to a better grouping of her children with reference to ability, and arranges for the assignment of work better suited to the needs and the abilities of the individual children.

Thorndike says: "No one unless he were himself an idiot in the trait of common sense, would train a genius and an idiot alike or expect them to develop alike." Does not the same principle hold true with reference to the training of the very superior and the very inferior minds? The children who are very superior to the average are not systematically given special attention in our schools, altho in a few places systems of rapid promotion have been inaugurated. It seems to me that the normal and the bright children are the ones who can profit most by special attention. Why should we spend **more** time, effort and money in providing instruction for the so-called "ungraded" room for the dull or defective children than we do for the bright? We employ the most thoroly trained, successful teachers in our efforts to bring these dull children up **toward** normal ability, realizing all the time that very few, if any, will really reach that mark. I would not minimize the importance of this work, but if our public school system is to survive, we must demand and get this same sort of special attention for the normal, for the bright, and for the dull children.

The presence in the same class of the greatly retarded, and the defective child is a hindrance to the progress of the normal and the bright, is an injustice to the teacher, and is of little, if any, value to the retarded child himself, for the training is not adapted to his needs. As patrons of the schools come more fully to realize these facts the schools must either change their plans of work, or public interest and public support will diminish. It is not a class problem, but for all classes and grades the problem is the same—to determine the child's mental capacity and to adapt his environment and training to that capacity. Unless individual differences are taken into consideration and allowances made, there is an immense waste of time and energy of both teachers and pupils, and public money appropriated for education fails to earn its face value.

"Plainly past efforts made at school grading fail to give groups of children of homogeneous mental ability. For lack of knowledge of their raw material teachers and school administrators are blundering along in the dark."*

Chapter V

THE PROBLEMS OF SCHOOL ADMINISTRATION DIRECTLY AFFECTED BY MENTAL TESTING

Mental testing should (a) assist in the adjustment of a flexible course of study; (b) aid in classification, segregation and promotion; (c) aid in discipline; (d) assist in the elimination of those mentally unfit for school work.

If one glances at table No. 7 which reproduces a cross section of the quality of raw material furnished to the teachers of the five respective school rooms, he cannot help realizing that the problems of education in these five rooms are vastly different. Yet these conditions could be duplicated in almost any city system of our country. To put the same course of study and the same standards of requirement before all these teachers and children seems to me to fail entirely of the true conception of the meaning of public education in and for a democracy. Thirteen of the children in room B are probably feeble-minded and twelve more are either borderzone or dull-normal cases. Only five or six have normal mental ability. The teacher in room B is struggling with the same course of study, and attempting to produce good citizens for the future with the same sort of training and treatment as that used by the teacher in room D, where thirteen of the pupils are superior and most of the rest are normal in mental ability. Is it just to any one concerned—children, teachers, taxpayers, or the future state of society—that these be given the same course of study or that the effort be made to teach them to master the same kind of work in the same length of time?

The study of individual differences brings us face to face with the necessity of a change in our curriculum. We shall have education with equal opportunities for all only when it is possible for each child to work to the maximum of his capacity, and to secure during those years when he is permitted, or required, to be in school that sort of training which will best fit **him** for his life's work.

When the course of study is adapted, mental testing will help to determine the classification of children into groups according to their ability to master the standard course of study, or the one suited to special needs. Those who are superior should move more rapidly. They should be able to save one, two, or three years of time during their period of Elementary Education. This is the group from which

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* Terman.

we have a right to expect the largest returns to society for the effort which society has put forth for its education. This is the group that is just beginning to come into its rights. Ordinarily this group has not been given the right amount of work to keep it busy. We cannot measure the serious results to later life-power caused by those habits of idleness, ease and carelessness that are apt to be formed by the child who seldom is required to exercise his maximum power in the solution of problems in early school life.

In the 1915 Report of the U. S. Commissioner of Education, page 40, we find this statement: "The public is becoming interested in the super-normal child, the school is rapidly becoming aware that it has neglected this problem." Superintendents everywhere are beginning to think about schemes of promotion that will care for the gifted children as well as for the normal and for the defective.

The reader's attention is called to an article entitled "Provision for the Gifted Child" in Educational Administration and Supervision for March, 1917. This article gives the findings of a questionnaire sent to all the cities of over 8,000 inhabitants in the United States. The questions relate to the provisions for gifted children in the schools and the desirability for such provision. The need is almost universally recognized, but the number of cities actually making some provision is comparatively small. Nearly all the provisions classify under three types: (1) More work for the gifted child—same length of time; (2) special rapidly moving class—regular course; (3) different course of study, providing extra subjects. Only eighteen cities are reported as using psychological tests in the discovery and classification of gifted children. A careful analysis proves that a number of these are using pedagogical rather than psychological tests. Those cities employing a psychologist for their schools use him almost exclusively in the work with defective children.

In my opinion the mental test (psychological, not pedagogical) is the only sure means that can be applied early in the course for the detection of the gifted, the normal, or the defective child. It should be understood that these groups will not be absolute but will shade imperceptibly into one another.

The defective child should be given work suited to his needs. It is little short of a crime to require such a child to attend school and then try to force him to accomplish work he is mentally incapable of doing, by repeating it for one, two, three, or four years. Rather give him **anything,** that is legitimate, which he can do and likes to do, until he reaches that development which will permit him to do something else. There is no need to try to teach a child to read or write or spell if he has not a mentality capable of using such knowledge to advantage. If he later develops such mentality he can then take the training much easier than now. By attempting to force that for which the child is incapable, we are in danger of

developing a very undesirable attitude toward school and toward life in general. After all, habits and attitudes toward life, society, and work are among the most valuable acquirements gained in school.

The course of study is planned usually to fit the normal or average child. If the standards for any particular grade or course are increased to fit the ability of the superior child the normal child is apt to suffer, and the inferior child be submerged. There is a natural tendency for the teacher or superintendent, unconsciously, to make a normal distribution of pupils in any class based upon the material in hand. This is clearly shown in table No. 6. In room C with a median I. Q. of 85 and a median mental age of 6-0 we have one pupil marked 1 in accomplishment, four marked 2, fourteen marked 3, ten marked 4, and five marked 5. In room D with a median I. Q. of 108.5 and a median mental age of 7-2 we have two pupils marked 1, four marked 2, thirteen marked 3, six marked 4, and three marked 5. The distribution of marks in the two rooms is almost identical, whereas, there is an average difference of more than one year in mental age in favor of room D, in addition to an average difference of 23.5 points of I. Q. in favor of room D. Such a difference is very great.

If the pupils of room D were transferred to the teacher of room C with her present standards of work, she would advance them one-half grade or, possibly, a whole grade and give them the same marks which they are now receiving. To put it in another way, if the pupils of room C should enter the class in room D, most of them would be hopelessly behind and would have to repeat the next term's work. Evidently the standards of either room C or of room D are in error. By the use of mental tests in connection with the large number of pedagogical tests that are now standardized, such discrepancies in standards of work as these can easily be removed. A pupil who can do standard work in one school should be able to do standard work of the same grade in another school in any part of the country.

For the course of study for the first grade to be made so hard that normal children of 7 year mental level can not succeed in passing it, would appear unfair to such children who fail. The task set for them would be beyond their ability. For a normal child to attend school regularly under fairly normal conditions and not be able to finish his Elementary School life on schedule time simply means the subtracting of the amount of time lost from his later educational training, from his apprenticeship in business, or from his period of earning power.

No matter to what group the child belongs, the standards of the school set the pace for his advancement. Should this pace be set for the bright child, for the average, for the dull, or for **all** these? A very important question for educators to raise in requiring any child to repeat his work is, Will repetition produce the most desirable result?

Mental testing should assist in the discipline of the school thru the fact that it makes possible the grouping of children according to their ability. Success means interest and interest removes many of the causes of trouble. For the same reason it should make happier children and happier teachers. Greater efficiency from both sides should result.

Finally mental testing should assist in the elimination from the school of those children who are so immature, or so low in mental level that it is not at all in the province of the school to struggle with their instruction with groups of other children.

Chapter VI

DIAGNOSIS AND PREDICTIONS FOR EACH CHILD TESTED

In order to see how personal traits correlate with intelligence each teacher was asked to give a careful rating of her pupils on a certain 24 personal traits (see Chapter I for description). These ratings were to be independent from the former ratings on school work and intelligence. We planned to have the influence of those ratings as far removed as possible from these. All pupils were first rated on one trait. Then all were rated on the second trait, then the third, etc. The purpose of this was to prevent any tendency on the part of the teacher to give a child a rating and then follow that same level for that child thruout the list of traits. In the way the ratings were made we feel that this tendency is almost entirely removed.

Correlations were made between the ratings of each trait and the I. Q.'s for 147 of the children. (Thru error three of the children were not rated.) These correlations range from Sense of Humor .582 as the highest, to Speed .281 as the lowest, all being positive correlations. With half or more of the traits the correlations are reasonably high, with the rest they are fair. The rating for any one trait, therefore, is apt to bear a positive relation to the intelligence of that child. The curve or average rating on all 24 of the personal traits for any one child, should be a very strong index to that child's intelligence level.

Such a curve was plotted for each of the 150 children. This curve with the I. Q. and mental age was made the basis for diagnosing each child with reference to the question "What will result from the next four years of school work?"

(The curves and tables containing the predictions for each child are so complex and so extensive that it is not practical to print them in this report. They can be found in the original thesis in the Stanford University Library.)

Following is a table showing the order of personal traits by rank of their correlation with the I. Q.'s:

	Trait	Correlation (Pearson)
1	Sense of Humor	.582
2	Power to Give Sustained Attention	.539
3	Persistence	.534
4	Initiative	.530
5	Accuracy	.525
6	Will Power	.500
7	Conscientiousness	.476
8	Social Adaptability	.474
9	Leadership	.441
10	Personal Appearance	.440
11	Cheerfulness	.432
12	Cooperation	.430
13	Physical Self-Control	.423
14	Industry	.408
15	Courage	.390
16	Dependability	.378
17	Talkativeness	.373
18	Intellectual Modesty	.345
19	Obedience	.345
20	Popularity among Fellows	.342
21	Evenness of Temper	.315
22	Emotional Self-Control	.295
23	Unselfishness	.290
24	Speed	.281

SUMMARY

The mental testing of children in five first grade rooms leads us to the following conclusions:

1. The variations in mental age are great, ranging from three years to eleven years.

2. The variations in mental level range from that of the imbecile to that of the very superior (45 I. Q. to 145 I. Q.).

3. The eight-year-old dull pupil (I. Q. 75) does not do quite as well in his school work (rated by the teacher) as the six-year-old normal pupil (I. Q. 100).

4. Mental age has a high correlation (.75) with school success as rated by the teacher.

5. The child below six-year mental age seldom succeeds in first grade work, unless he is either over age, or is repeating, or both.

6. Intelligence has a fairly high correlation (.48), with social status.

7. The different nationality groups, here studied, show different median mental levels. Further investigation should show whether these differences are due to nationality, social status, suitability of the tests, or to other causes.

8. As rated by the teacher, boys are less capable in accomplishment of school work than are girls of equal mentality.

9. The principal cause of retardation in the first grade is low mentality.

10. If our public schools are truly to educate all the children, they must take into account the individual differences in children and must make provision for the same in gradation, promotion, and adaptation of the course of study.

11. Mental testing should become a fundamental part of school administration.